**T08D06 - Dissociation constants of Acids and Bases**

*Part I: strong and weak acids and bases:*

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| **Strong Acids** | **Weak Acids** | **Weak Bases** | **Strong Bases** |
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*Part II:Definitons:*

Dissociation

Ionization

Equilibrium

Completion vs. Equilibrium

*Part III: How to calculate the pH, pOH, [H+], [OH-] of acids and bases – write the equilibrium constant to figure it out:*

Strong Acids and Bases: HA + H2O 🡪 H+ + H3O+ (for acids)

Notice, the only difference is in the arrow for completion or equilibrium!

Weak Acids and Bases: HA + H2O ⇆ H+ + H3O+ (for acids)

*Part IV: Ionization reactions.*

Write the ionization reactions for each of the following reactions [include water in the reaction. Include the states for each-aq or l.

1. hydrochloric acid
2. acetic acid
3. ammonium ion
4. nitrous acid
5. sulfuric acid
6. nitric acid

*Part V: Write the equilibrium expression for the following letters from part IV:*

b.

c.

d.

f.

*Part VI: Equilibrium Constant*

*Calculate the pH, pOH, [H+] , and [OH-] concentration of each of the following:*

a. 1.0 M solution of HNO3

b. 0.65 M solution of NaOH

c. 13.45 g of H2SO4 placed in water to make 325 mL of solution. [Diprotic acid but only the first ionization step should be used.]

d. 36.5 g of Ba(OH)2 placed in water to make 965 mL of solution.

e. a 1.5 M solution of KOH

f. a 0.50 M solution of a acetic acid that is a **weak acid** (Ka = 1.8 x 10-5)

1. Acetic acid has a Ka = 1.78 x 10¯5. Determine the pH of a 0.100 M solution.
2. Calculate the hydronium ion ([H3O+]) concentration of a 0.25 M solution of benzoic acid,

HC7H5O2, Ka = 6.46 x 10¯5

1. Hydrocyanic acid, HCN, has a Ka of 4.93 x 10¯10. Find the pOH and [H3O+] of a 0.100 M

solution of hydrocyanic acid.

1. The weak base analine, C6H5NH2, has a Kb of 4.26 x 10¯10. Find the pH, pOH and [H3O+] of a

0.100 M solution of analine.

1. Calculate the pH of a 0.75 M solution of a methylamine, CH3NH2 whose Kb = 4.54 x 10¯4.
2. Calculate the pH of a 0.155 M ammonia solution. Kb = 1.77 x 10¯5
3. Chloroacetic acid, ClCH2COOH, has a Ka of 1.40 x 10¯3. Find the pH and [OH¯] of a 0.30 M

solution of chloroacetic acid.